UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Washington, D.C.

NOTICE OF RELEASE OF JC COTTON GERMPLASM LINES WITH UNIQUE FEATURES IN LINT YIELD AND FIBER QUALITY

The Agricultural Research Service, United States Department of Agriculture, announces the release of four cotton lines of John Cotton (JC) germplasm. These lines are JC14, JC32, JC60 and JC65. The JC germplasm underwent multiple generations of introgression which have stabilized genetic make-ups with exotic genes from interspecific crosses. The released lines contain either exceptional fiber quality or unique combinations of lint yield and fiber properties. The exotic genes in these lines for fiber quality and/or lint yield can be transferred into upland cotton cultivars for genetic improvement of both lint yield and fiber quality.

The released JC lines were selected from JC germplasm which was initially developed by John Cotton (USDA-ARS at Las Cruces, NM) in the early 1970s at Las Cruces, NM. The JC germplasm was derived from multiple crosses between Gossypium hirsutum L., Acala 1517 type cultivars, and G. barbadense L. The exact parents for crosses were unknown. Open pollination was allowed among parental plants and their hybrid progenies in a field at Las Cruces. The population underwent multiple generations of introgression between 1970s and 1990s. A sub-population was forwarded to Stoneville, MS and advanced by Dr. William R. Meredith, Jr. since the 1990s in a predominantly selfing environment. Previous evaluation of 200 JC lines identified highly significant genotypic variation for lint yield and fiber quality in this germplasm. Four lines were selected from the 200 JC lines in this evaluation and tested for yield and fiber quality in trials at six location-year environments in 2006, 2007 and 2008. Two cultivars, 'Deltapine 555BR' (DP555BR) and 'Phytogen 72' (PHY72) were grown as checks in all trials.

The existence of introgressed exotic genes in JC germplasm may have provided opportunities to identify individuals that posses unique and favorable combinations of lint yield and fiber quality performance that overcome the negative relationship between lint yield and fiber quality reported in previous studies by Miller and Rawlings in 1967 and Meredith and Bridge in 1971. Agronomic performance and fiber properties of the selected lines and the check cultivars during the trials are presented in Table 1. The two check cultivars, DP555BR and PHY72, were used in the National Variety Tests for the years of 2005, 2006 and 2007. Among them, DP555BR has been the most popular cultivars in the USA because of its high yield. This cultivar produced the highest lint yield, 1565 kg/ha with the lowest fiber quality among the entries during the trials. PHY72, the high fiber quality check, displayed high fiber quality and moderate lint yield, 1090 kg/ha. The lint yields of the four released lines ranged from 830 to 1190 kg/ha, lower than that of DP555BR. JC32 and JC65 yielded more than PHY72. Lint yield of JC14 and JC60 were moderate, 881 and 833 kg/ha, respectively, compared to DP555BR. Lint percent is a critical yield component for maintaining high lint yield. Although lint percent of JC14 and JC60 were lower than that of PHY72, JC32 and JC65 produced lint percent of 39.3 and 40.4%, respectively, either similar or significantly ($p<0.05$) greater than that of PHY72. All four released lines

displayed fiber quality superior to the high quality check PHY72. The lines of JC14 and JC60 displayed bundle strength of 277 and 281 kN m/kg, 50% span lengths of 15.4 and 15.7 mm, short fiber contents of 3.93 and 3.21%, and fiber fineness of 167 and 165 mg km-1, respectively, superior to those of the high quality check PHY72. The superiority in both short fiber content and fineness in these two lines were considered unique because the negative association was reported between the two traits. Most of fiber properties in JC32 and JC65 were also superior to PHY72 with elongation of 8.21 and 8.06%, short fiber contents of 3.52 and 3.46%, and fineness of 174 and 174 mg/km, respectively. Specifically, JC65 was released for its unique combination of lint yield and fiber quality. Compared with our previous released germplasm lines selected from another introgressed population, i.e., Species Polycross (SP), JC65 is more desirable for the combination of lint yield and fiber quality. JC65 produced lint yield of 1190 kg/ha, 9.2% higher than that of PHY72 and significantly ($p<0.05$) less short fiber content and finer fineness than those of PHY72. Meanwhile, JC65 produced 252 kN m/kg bundle strength, comparable to that of PHY72.

The development of the released lines was led by Linghe Zeng. The JC germplasm was advanced by William R. Meredith, Jr. Evaluation and selection of final lines for release were made by Linghe Zeng and William R. Meredith, Jr. of the Crop Genetics and Production Research Unit, USDA-ARS at Stoneville, MS, and B. Todd Campbell of the Coastal Plain Soil, Water and Plant Research Center, USDA-ARS at Florence, SC.

Small quantities of seeds are available to cotton breeders, geneticists, and other research personnel upon written request to: Linghe Zeng, Crop Genetics and Research Production Unit, USDA-ARS, 141 Experiment Station Rd., P.O. Box 345, Stoneville, MS38776. It is requested that appropriate recognition of the source be given when germplasm lines contribute to the development of a new breeding line, hybrid, or cultivar. Genetic material of this release will be deposited in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new cultivars.

Signature:

Julia A. Knight Jr. — 6/3/09

Deputy Administrator, Crop Production and Protection — Date
Agricultural Research Service, U.S. Department of Agriculture